



## 30V N+P Dual Channel MOSFETs

### General Description

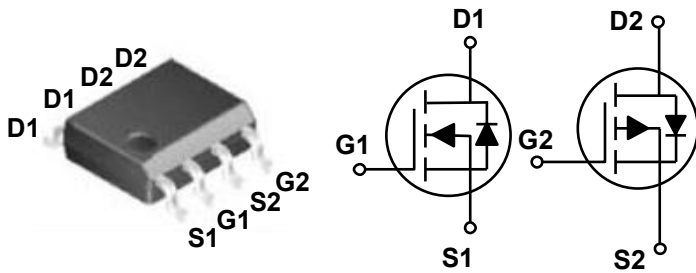
These N+P dual Channel enhancement mode power field effect transistors are using trench DMOS technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency fast switching applications.

$BV_{DSS}$	$R_{DS(ON)}$	$I_D$
30 V	20 mΩ	8 A
-30 V	50 mΩ	-5.5 A

### Features

- Fast Switching
- Green Device Available
- Suit for 4.5V Gate Drive Applications

SOP-8 Pin Configuration



### Applications

- DC Fan
- Motor Drive Applications
- Networking
- Half / Full Bridge Topology

### Absolute Maximum Ratings $T_c=25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Rating		Units
$V_{DS}$	Drain-Source Voltage	30	-30	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	$\pm 20$	V
$I_D$	Drain Current - Continuous ( $T_A=25^\circ\text{C}$ )	8	-5.5	A
$I_{DM}$	Drain Current - Pulsed (NOTE 1)	32	-22	A
EAS	Single Pulse Avalanche Energy (NOTE 2、6)	14	5	mJ
IAS	Single Pulse Avalanched Current	17	-10	A
$P_D$	Power Dissipation ( $T_A=25^\circ\text{C}$ )	2		W
$T_J$	Operating Junction Temperature Range	-55 to 150		$^\circ\text{C}$
$T_{STG}$	Storage Temperature Range	-55 to 150		$^\circ\text{C}$
Marking Code		BC020 , DS3712		

### Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction to Ambient	---	62.5	$^\circ\text{C/W}$

**30V N+P Dual Channel MOSFETs****N Channel Electrical Characteristics (T<sub>J</sub>=25°C, unless otherwise noted)****Off Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250uA	30	---	---	V
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =30V, V <sub>GS</sub> =0V	---	---	1	uA
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	---	---	±100	nA

**On Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> =10V, I <sub>D</sub> =8A	---	---	20	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =5A	---	---	30	
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA	1.2	---	2.5	V
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =10V, I <sub>D</sub> =3A	---	3	---	S

**Dynamic and Switching Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =15V, V <sub>GS</sub> =4.5V, I <sub>D</sub> =8A	---	4.1	---	nC
Q <sub>gs</sub>	Gate-Source Charge		---	1	---	
Q <sub>gd</sub>	Gate-Drain Charge		---	2.1	---	
T <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> =15V, V <sub>GS</sub> =10V, R <sub>G</sub> =6Ω, I <sub>D</sub> =1A	---	2.8	---	nS
T <sub>r</sub>	Rise Time		---	7.2	---	
T <sub>d(off)</sub>	Turn-Off Delay Time		---	15.8	---	
T <sub>f</sub>	Fall Time		---	4.6	---	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, F=1MHz	---	345	---	pF
C <sub>oss</sub>	Output Capacitance		---	55	---	
C <sub>rss</sub>	Reverse Transfer Capacitance		---	32	---	
R <sub>g</sub>	Gate resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, F=1MHz	---	3.2	---	Ω

**Drain-Source Diode Characteristics and Ratings**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I <sub>S</sub>	Continuous Source Current	V <sub>G</sub> =V <sub>D</sub> =0V, Force Current	---	---	8	A
I <sub>SM</sub>	Pulsed Source Current		---	---	16	A
V <sub>SD</sub>	Diode Forward Voltage	V <sub>GS</sub> =0V, I <sub>S</sub> =1A	---	---	1	V

**NOTES :**

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. V<sub>DD</sub>=25V, V<sub>GS</sub>=10V, L=0.1mH, I<sub>AS</sub>=17A, R<sub>G</sub>=25Ω, Starting T<sub>J</sub>=25°C.
3. The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%.
4. Essentially independent of operating temperature.



Characteristics Curves

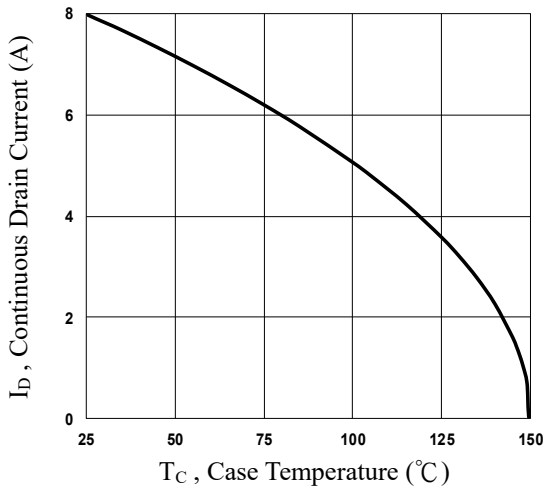


Fig.1 Continuous Drain Current vs.  $T_c$

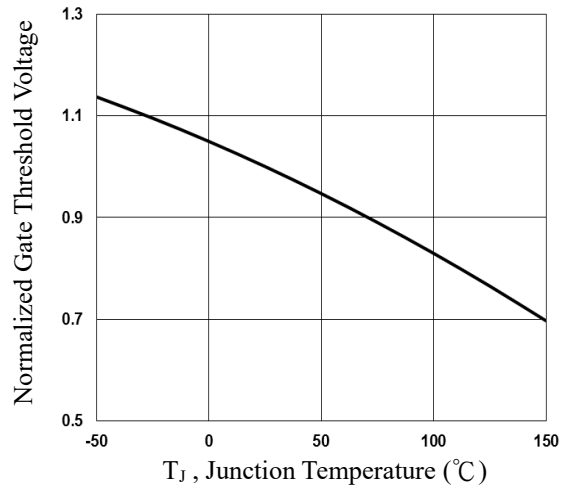


Fig.2 Normalized  $V_{th}$  vs.  $T_j$

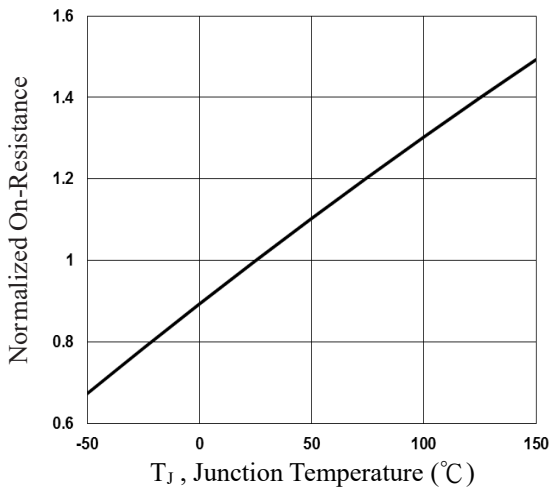


Fig.3 Normalized  $R_{DS(on)}$  vs.  $T_j$

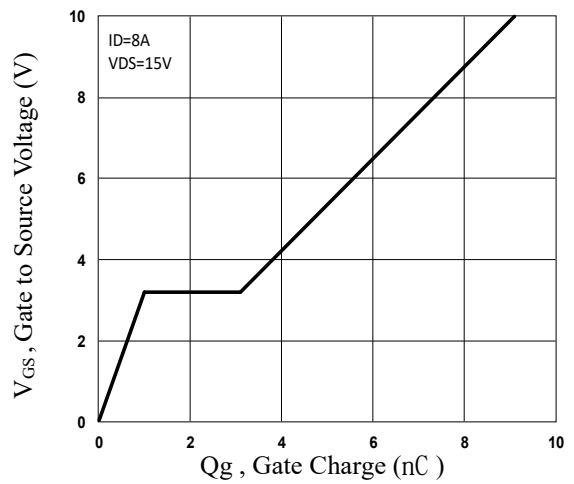


Fig.4 Gate Charge Characteristics

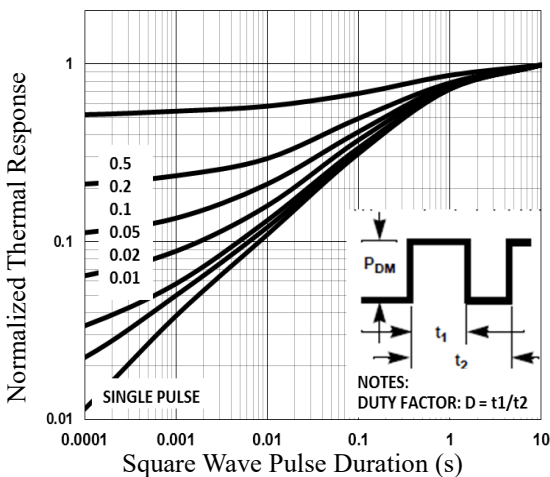


Fig.5 Normalized Transient Impedance

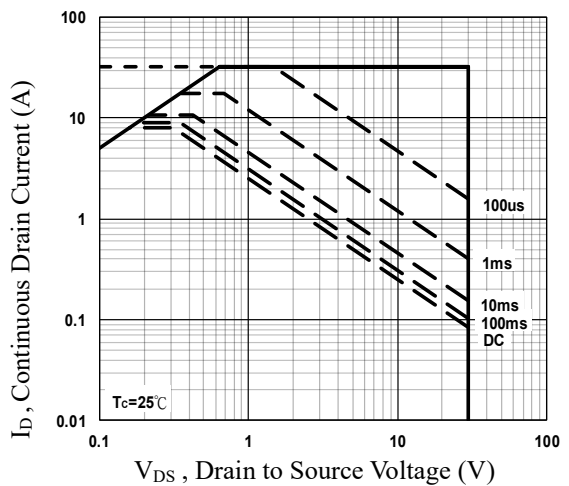


Fig.6 Maximum Safe Operation Area

**30V N+P Dual Channel MOSFETs****P Channel Electrical Characteristics (T<sub>J</sub>=25°C, unless otherwise noted)****Off Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> = 0V , I <sub>D</sub> = -250uA	-30	---	---	V
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> = -30V , V <sub>GS</sub> = 0V	---	---	-1	uA
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> = ±20V , V <sub>DS</sub> = 0V	---	---	±100	nA

**On Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance	V <sub>GS</sub> = -10V , I <sub>D</sub> = -5A	---	---	50	mΩ
		V <sub>GS</sub> = -4.5V , I <sub>D</sub> = -3A	---	---	90	
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> = -250uA	-1.2	---	-2.5	V
gfs	Forward Transconductance	V <sub>DS</sub> = -10V , I <sub>D</sub> = -3A	---	3.5	---	S

**Dynamic and switching Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> = -15V , V <sub>GS</sub> = -4.5V , I <sub>D</sub> = -3A	---	5.1	---	nC
Q <sub>gs</sub>	Gate-Source Charge		---	2	---	
Q <sub>gd</sub>	Gate-Drain Charge		---	2.2	---	
T <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> = -15V , V <sub>GS</sub> = -10V , R <sub>G</sub> = 6Ω , I <sub>D</sub> = -1A	---	3.4	---	nS
T <sub>r</sub>	Rise Time		---	10.8	---	
T <sub>d(off)</sub>	Turn-Off Delay Time		---	26.9	---	
T <sub>f</sub>	Fall Time		---	6.9	---	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> = -15V , V <sub>GS</sub> = 0V , F= 1MHz	---	560	---	pF
C <sub>oss</sub>	Output Capacitance		---	55	---	
C <sub>rss</sub>	Reverse Transfer Capacitance		---	40	---	

**Drain-Source Diode Characteristics and Ratings**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I <sub>S</sub>	Continuous Source Current	V <sub>G</sub> =V <sub>D</sub> =0V , Force Current	---	---	-5.5	A
I <sub>SM</sub>	Pulsed Source Current		---	---	-11	A
V <sub>SD</sub>	Diode Forward Voltage	V <sub>GS</sub> =0V , I <sub>S</sub> = -1A	---	---	-1	V

**NOTES :**

5. Repetitive Rating : Pulsed width limited by maximum junction temperature.
6. V<sub>DD</sub>=-25V, V<sub>GS</sub>=-10V, L=0.1mH, I<sub>AS</sub>=-10A, R<sub>G</sub>=25Ω, Starting T<sub>J</sub>=25°C.
7. The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%.
8. Essentially independent of operating temperature.



Characteristics Curves

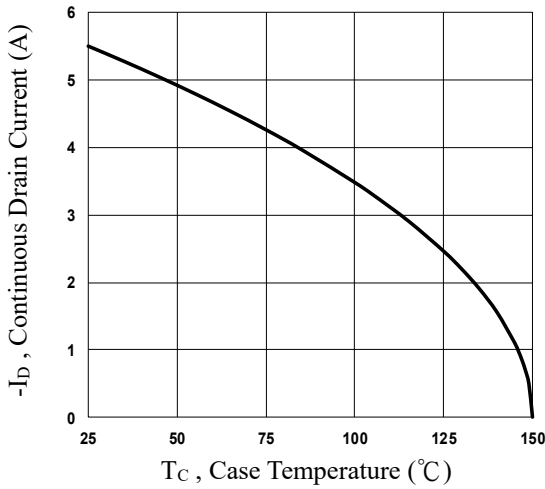


Fig.7 Continuous Drain Current vs.  $T_c$

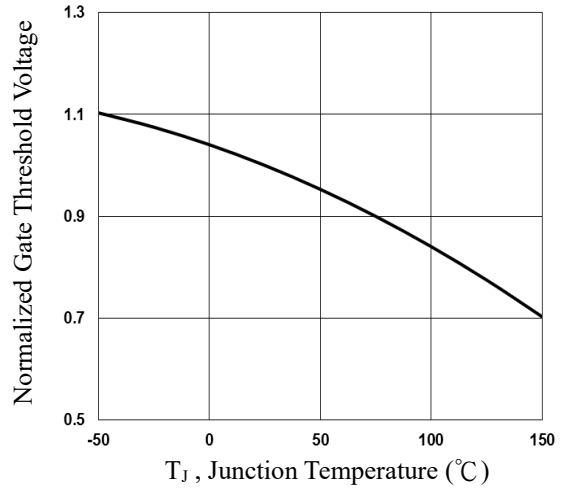


Fig.8 Normalized  $V_{th}$  vs.  $T_j$

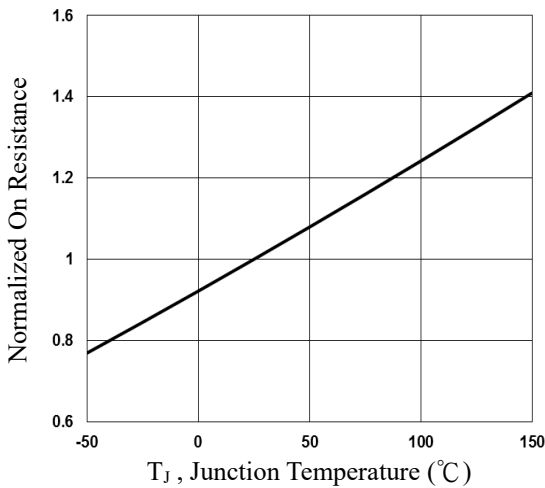


Fig.9 Normalized  $R_{DS(on)}$  vs.  $T_j$

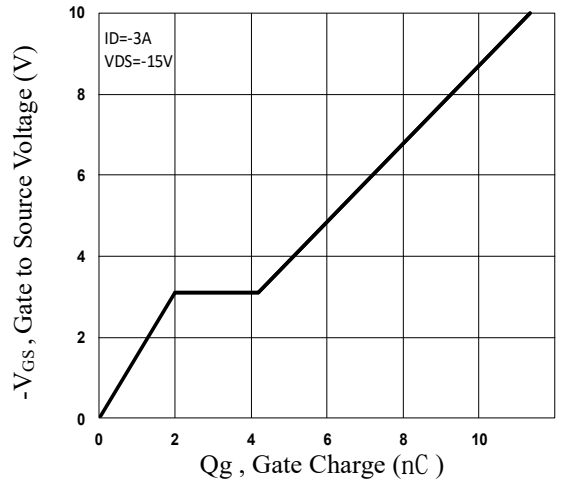


Fig.10 Gate Charge Characteristics

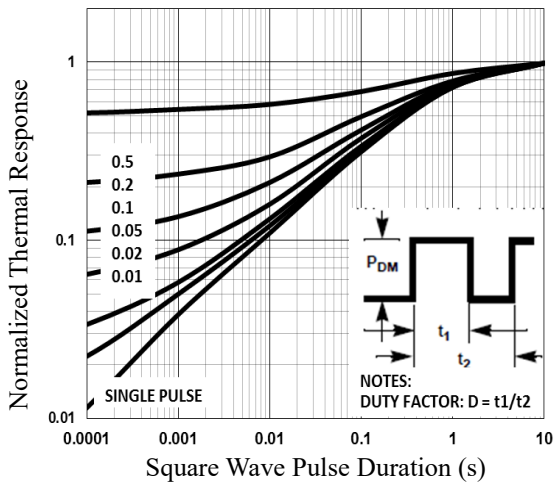


Fig.11 Normalized Transient Impedance

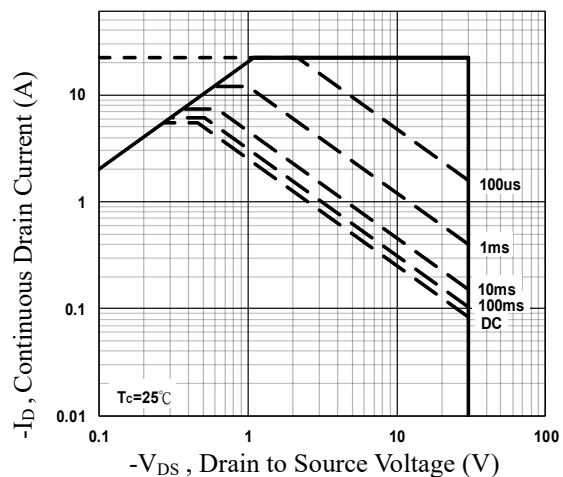


Fig.12 Maximum Safe Operation Area

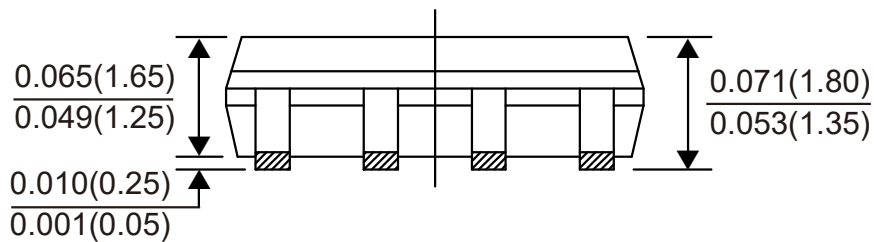
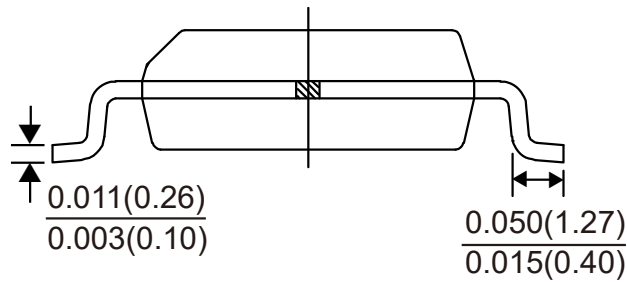
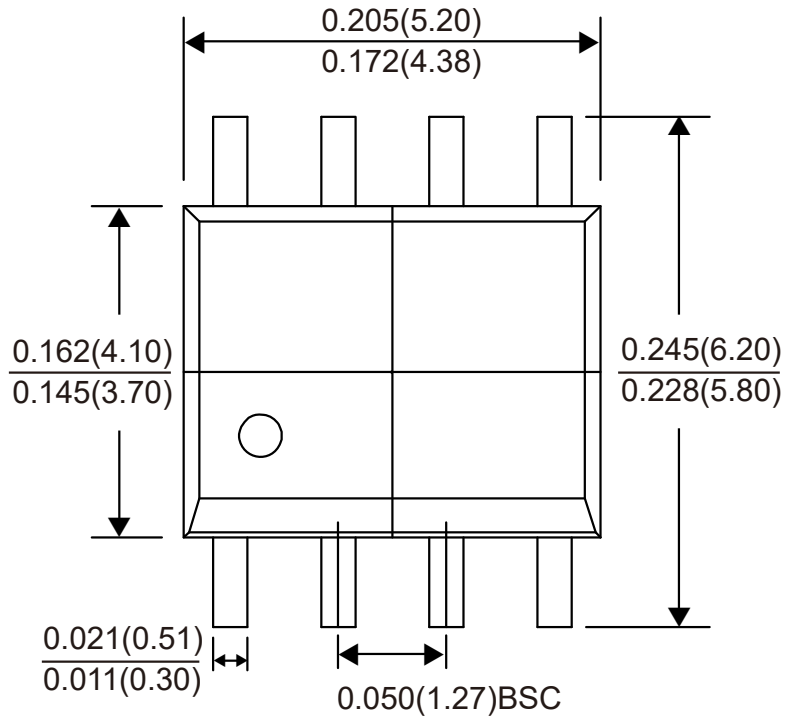


**S8MBC020**



# 30V N+P Dual Channel MOSFETs

## Package Outline Dimensions



### SOP-8

Dimensions in inches and (millimeters)



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